

EMFAC2002

On-Road Emissions Inventory Model

Model Release
Informational Session
November 7, 2002 - El Monte

Presented by:
The Mobile Source Analysis Branch
Planning and Technical Support Division



Agenda

- Welcome
- Need for Updated Inventory
- Summary of Most Current EMFAC
- Modifications to the most current EMFAC
 - ◆ Revised Evaporative Emissions Schedule
 - ◆ Correction to 2007+ PM Emission Rates
 - ◆ Passenger Car Accrual Rates
 - ◆ Revisions to I/M Assumptions
 - ◆ Updated Activity (Speed Distributions)
 - ◆ Updated Activity (Vehicle-miles Traveled)
 - ◆ Tire and Brake Wear Emissions
 - ◆ School Bus Activity
 - ◆ Extended Idle (Heavy Duty Diesel and School Bus)
 - ◆ Monthly Average Fuel RVP and RFG II
 - ◆ Revisions to Population and Age
- Questions
- Discussion of Transmittal to U.S. EPA

| Statewide (Tons per Day) | ROG total | CO | NO_x | PM total |
|---|------------------|-------------|-----------------------|-----------------|
| EMFAC 2001 Baseline | 616 | 5756 | 965 | 56.6 |
| Revised Evaporative Emissions Schedule | 0 | 0 | 0 | 0 |
| Correction to 2007+ PM Emission Rates | 0 | 0 | 0 | -1.5 |
| Passenger Car Accrual Rates | -14 | -211 | -16 | -0.1 |
| Revisions to I/M Assumptions | +1 | +11 | +2 | 0 |
| Updated Activity (Speed Distribution) | -4 | -32 | +23 | -1.0 |
| Updated Activity (Vehicle Miles Traveled) | +8 | +68 | +12 | +0.8 |
| Tire and Brake Wear Emissions | 0 | 0 | 0 | -5.7 |
| School Bus Activity | +1 | +12 | +11 | +0.5 |
| Extended Idle (Heavy Diesel and School Bus) | +2 | +9 | +26 | +0.5 |
| Monthly Average Fuel RVP & RFGIII | 0 | 0 | 0 | 0 |
| Revisions to Population and Age | -71 | -416 | +21 | +0.4 |
| New Baseline—EMFAC2002 | 539 | 5197 | 1044 | 50.5 |

Revised Evaporative Emissions Schedule

- EMFAC2001 incorporated latest LEVII and federal TIER2 assumptions for exhaust.
- Related modifications were not made for Evaporative Emissions (PZEVs).
- Overall effect on inventory = 0.1 tpd decrease in ROG in 2010, 10 tpd by 2030.

2007+ PM Adjustment

- Stringent new exhaust emission standards for heavy duty trucks beginning with the 2007 model year.
- Emission adjustments made for HC, CO and NOx in EMFAC2001.
- No change made for PM.
- Correction results in 1.5 tpd decrease in PM in 2010, 7 tpd by 2020.

Passenger Car Mileage Accrual Rates

- Mileage Accrual Rates (MAR):
 - ◆ Miles per year traveled by a vehicle as a function of age and area.
- Area specific MARs from I/M Data.
- EMFAC maintains relationship between MAR, vehicle population (Pop) and vehicle miles traveled (VMT).
 - ◆ $VMT = Pop * Mar$
- Adjustment made in EMFAC2000 to improve agreement between modeled and reported VMT.

Passenger Car Accrual Rates (Contd.)

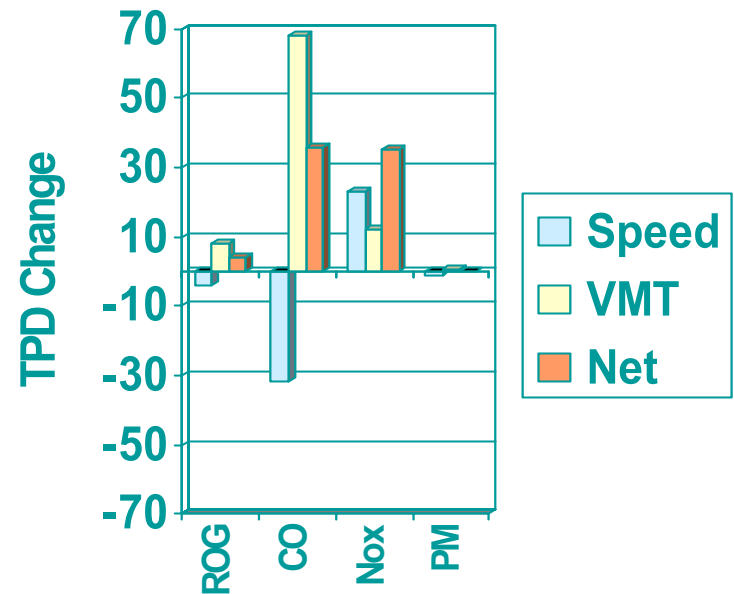
- Passenger Car MARs set equal to Light Duty Trucks.
- Adjustment caused VMT to be higher for older passenger cars in several areas.
- Pass Car MARs were reset in EMFAC2002.
- Modification results in 14 tpd reduction in ROG, 211 tpd for CO, 16 tpd reduction for Nox and 0.1 tpd reduction in exhaust PM in 2010.

Revisions to I/M Assumptions

- EMFAC2001 carried an assumption of more stringent pass/fail criteria to be implemented in 2010.
- EMFAC2002 eliminates this assumption.
- The overall effect on the inventory is an increase of 0.7 tpd ROG, 10.6 tpd CO and 2.2 tpd NOx in 2010.

Updates to Activity (Speed and VMT)

- Latest information from COGs and MPOs on VMT and Speed Distribution (% of VMT by Speed) incorporated into EMFAC2002.



Tire and Brake Wear Emissions

- EMFAC uses standard ratios to scale passenger car emissions to other vehicle classes in some instances.
- The ratio of the exhaust emission standards was mistakenly applied to tire and brake wear in previous versions.
- Correction results in a reduction of 5.7 tpd PM in 2010.

School Bus Activity

- EMFAC assumes school buses only operate during two daily time periods:
 - ◆ Between 6:00 and 9:00 a.m.
 - ◆ Between 3:00 and 6:00 p.m.
- All operation occurring between 9:00 a.m. and 3:00 p.m. and 6:00 p.m. and 6:00 a.m. was discarded.
- Redistributing this activity results in an increase of 1, 12, 11 and 0.5 tpd for ROG, CO, NOx and PM, respectively in 2010.

Extended Idle for Heavy-Duty Trucks and Buses

- EMFAC2000 included Idle as separate process.
- Idle activity was limited to “key-on” to “key-off” events with no appreciable movement to avoid double counting.
- Analysis of instrumented truck data suggests average truck idle time of 104 minutes per day compared to 13 minutes per day in EMFAC2000.
- Inclusion of Extended Idle results in an increase of 9 tpd CO and 26 tpd NO_x in 2010.

Monthly Average Fuel RVP and RFGIII

- Modification to estimate of average RVP during transition from “summer” to “winter” months.
- Delay in introduction of RFGIII
- Changes do not impact the summertime 2010 inventory.

Changes to Vehicle Population and Age Distribution

- Vehicle population information provided by California Department of Motor Vehicles.
- EMFAC 2001 utilized 1997 and 1998 data extractions.
- EMFAC 2002 updates population with latest information available in 2002.

Population and Age Distribution (Contd.)

- Database screened for:
 - ◆ Duplication
 - ◆ Non Qualifying Fuel Types
 - ◆ Off-Road Vehicles
 - ◆ Vessels
 - ◆ Trailers
- Remaining Data sorted by Geographic Area Index (69)
- Out of State and Out of Country addresses discarded.

Population and Age Distribution (Contd.)

- Vehicles are sorted into major categories
 - ◆ Passenger Cars
 - ◆ Buses (Transit/School)
 - ◆ Motorcycles
 - ◆ Motor Homes
 - ◆ TRUCKS
- Trucks are further divided by weight
 - ◆ Light Truck 1 Light Truck 2
 - ◆ Medium Truck Light Heavy 1
 - ◆ Light Heavy 2 Medium Heavy Truck
 - ◆ Heavy Heavy

Population and Age Distribution (Contd.)

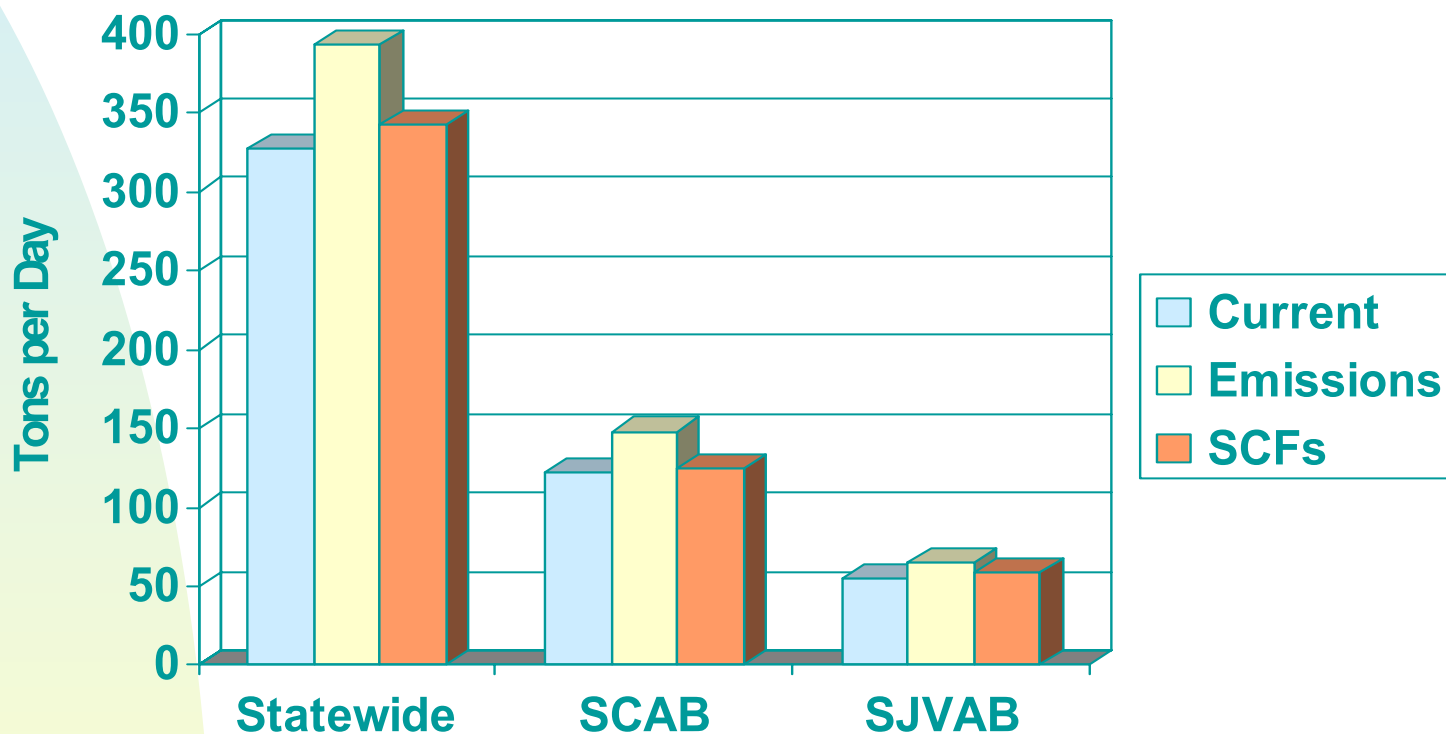
- Truck weigh designation made by:
 - ◆ DMV Weight Code
 - ◆ Manufacturer/Model Information
 - ◆ VIN Decoder
- Vehicles sorted by fuel type:
 - ◆ Gas
 - ◆ Diesel
 - ◆ Electric
- Vehicles sorted by Age:
 - ◆ 1-45+

| 1999 Vehicle Population | | | |
|--------------------------|--------------------|------------|------------|
| Vehicle Class | Weight Class (GVW) | EMFAC2001 | EMFAC2002 |
| Passenger Car | All | 14,068,400 | 12,302,560 |
| Light-Duty Truck 1 | 0 - 3,750 | 2,123,660 | 3,277,646 |
| Light-Duty Truck 2 | 3,751 - 5,750 | 3,758,850 | 3,362,701 |
| Medium-Duty Truck | 5,751 - 8,500 | 1,595,970 | 1,483,471 |
| Light-Heavy-Duty Truck 1 | 8,501 - 10,000 | 261,618 | 230,160 |
| Light-Heavy-Duty Truck 2 | 10,001 - 14,000 | 79,379 | 75,656 |
| Medium-Heavy-Duty Truck | 14,001 - 33,000 | 255,519 | 225,792 |
| Heavy-Heavy-Duty Truck | 33,001 + | 168,663 | 136,695 |
| School Bus | All | 28,022 | 23,559 |
| Transit Bus | All | 13,534 | 25,399 |
| Motor Home | All | 150,398 | 266,205 |
| Motorcycle | All | 337,146 | 380,629 |
| | | | |
| Total | | 22,841,159 | 21,790,473 |

Heavy-Duty Truck Testing

- 25 Heavy-Heavy Duty Diesel Trucks tested in recently completed project.
- Two issues raised:
 - ◆ NOx emission rates based on current data may be underestimated.
 - ◆ Current model may not adequately reflect “off-cycle” NOx emissions.
- Internal analysis / Meetings with external experts is on-going.

Heavy-Heavy Duty Truck NO_x Inventory (Running Exhaust in Tons per Day)



Transmittal to U.S. EPA

- EMFAC2002 will be used for the upcoming series of SIP updates
- Federal transportation conformity rules require U.S. EPA to approve emissions models used to assess conformity with these SIPs (40 CFR 93.111)
- Timely U.S. EPA approval of EMFAC2002 is needed to avoid risk of losing transportation funds
- Transmittal planned for November 2002

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WEBSITE - <http://www.arb.ca.gov/msei/msei.htm>



